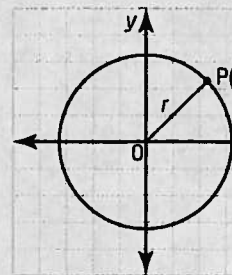


Key Concepts

- An equation for the circle with centre at the origin and radius r is $x^2 + y^2 = r^2$.
- The radius of a circle centred at the origin is $r = \sqrt{x^2 + y^2}$.



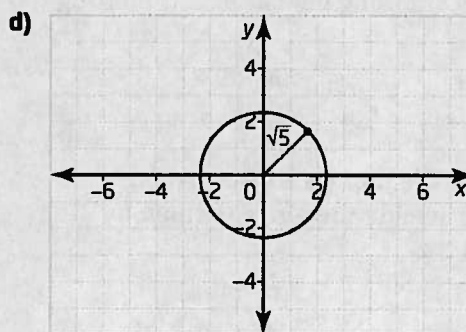
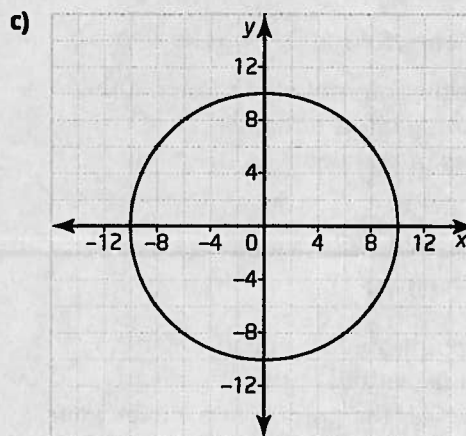
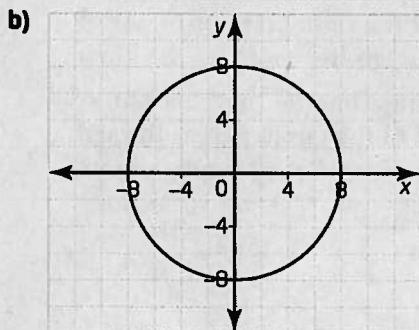
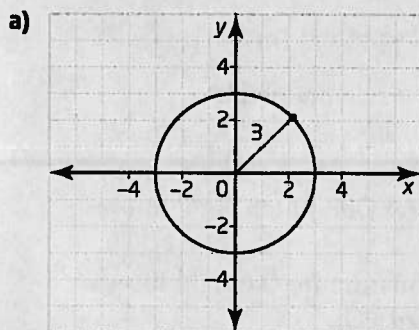
Communicate Your Understanding

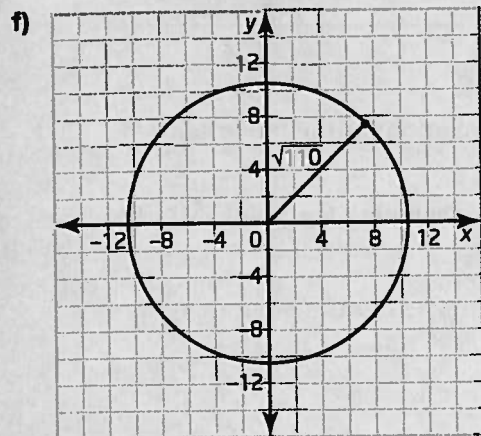
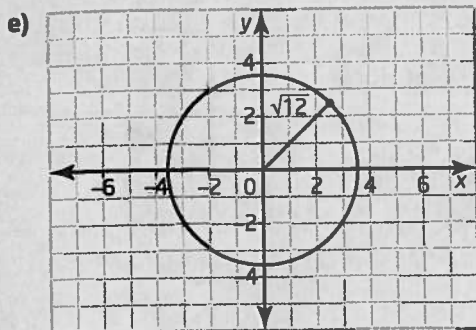
- C1** Outline how you would find an equation for the circle centred the origin with a radius of 12.
- C2** Describe how you would determine whether the point $(3, 5)$ lies on the circle defined by $x^2 + y^2 = 35$.
- C3** Explain how you would determine whether the point $(8, 8)$ lies inside the circle defined by $x^2 + y^2 = 100$.

Practise

For help with question 1, see Example 1.

1. Determine an equation for each circle.





For help with questions 2 to 4, see Example 2.

2. For each equation, state the radius of the corresponding circle and give the coordinates of one point on the circle.

a) $x^2 + y^2 = 36$	b) $x^2 + y^2 = 144$
c) $x^2 + y^2 = 20$	d) $x^2 + y^2 = 50$
e) $x^2 + y^2 = 1.69$	
3. For each point, find an equation for the circle that is centred at the origin and passes through the point. Then, check your answer by graphing the circle and plotting the point.

a) $(-4, 3)$	b) $(5, 2)$
c) $(-3, -6)$	d) $(-7, 12)$
4. Determine whether each point is on, inside, or outside the circle defined by $x^2 + y^2 = 34$.

a) $(5, -3)$	b) $(4, 4)$
c) $(-6, 0)$	d) $(-3, -5)$
e) $(2, -6)$	f) $(\sqrt{34}, 0)$

Connect and Apply

5. A satellite orbits Earth on a circular path with equation $x^2 + y^2 = 1.44 \times 10^8$, with distances measured in kilometres. Another satellite orbiting in the same plane passes through the point $(8000, 9800)$. Is this satellite inside the orbit of the first one?
6. Determine an equation for the circle that has a diameter with endpoints $A(-4, 3)$ and $B(4, -3)$.
7. The point $(a, 8)$ lies on the circle defined by $x^2 + y^2 = 100$.
 - a) Explain why there are two possible values for a . Find these values.
 - b) Use a graph to check that the points corresponding to both values for a are on the circle.
8. A farmer is building a circular corral to hold livestock. With distances measured in metres, the shape of the corral is modelled by the equation $x^2 + y^2 = 64$.
 - a) Find the length of fencing required for this corral.
 - b) Find the area of the corral.
9. a) Graph the circle defined by $x^2 + y^2 = 100$.
 - b) Verify algebraically that the points $P(-8, 6)$ and $Q(6, 8)$ are both on the circle.
 - c) Find an equation for the right bisector of the chord PQ .
 - d) Verify that the right bisector in part c) passes through the centre of the circle.
 - e) Do you think that the right bisector of any chord of the circle passes through the centre of the circle? Explain your reasoning.